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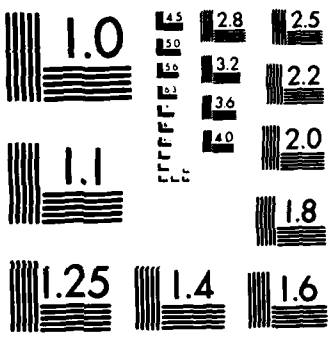

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USAFETACP 105-3 1 November 1984

AN INTRODUCTION TO USAFETAC

United States Air Force

ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER

SCOTT AFB, ILLINOIS

DEPARTMENT OF THE AIR FORCE
USAF Environmental Technical Applications Center (MAC)
Scott Air Force Base, Illinois 62225

USAFETAC PAMPHLET 105-3

1 November 1984

Weather

AN INTRODUCTION TO USAFETAC

This pamphlet describes the mission, organization, and capabilities of the USAF Environmental Technical Applications Center (USAFETAC) and answers those questions most frequently asked by potential users of USAFETAC's services:

* What is USAFETAC?

* What are its resources and capabilities?

* What support products are provided?

* Who is eligible for support?

* How is this support requested?

* How is the support provided once a request is received?

This pamphlet is meant to inform potential users about some of the products and support available at USAFETAC. It is a concise overview aimed primarily at those unfamiliar with our capabilities. The projects and products briefly described typify the support offered, but are not meant to limit the user to the specific questions and applications that inspired them. USAFETAC's services are responsive to the user's environmental needs or requests. Refer to AWSR 105-10 for policies and responsibilities for the production and distribution of AWS climatic products. Refer to AWSR 105-18 and AWSR 215-1 which describe procedures for requesting support from USAFETAC. For further information write to: USAFETAC/DO, Scott AFB, IL 62225 or call Autovon 638-4024/Commerical (618) 256-4024.

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Chapter 1

MISSION AND ORGANIZATION

1-1. USAFETAC MISSION - The mission of USAFETAC is to assess the natural environment from a historical perspective and advise the United States Air Force, the United States Army, and other agencies as directed, on its effects.

a. USAFETAC services have evolved in purpose and sophistication to keep pace with:

(1) The influx of information due to technological advances in the collection and evaluation of meteorological data.

(2) The growing number of requests for services.

(3) The increasing complexity of those requests.

b. Access to advanced computers and rapid communications has enabled USAFETAC to produce tailored products in a fraction of the time previously required. A series of Data Automation Requests (DARs) to enhance our computer capabilities is intended to keep pace with a growing workload.

1-2. PERSONNEL AND ORGANIZATION - USAFETAC is a named Air Force organization assigned to the Air Force Global Weather Central (AFGWC). As of October 1984 USAFETAC was authorized 158 positions at Scott AFB, IL and 85 positions at Operating Location A (OL-A), Asheville, NC. Of the positions at Scott AFB, 54 were officers, 81 were enlisted, and 23 were civilian. There were 39 officer slots for meteorologists with advanced degrees (AFSCs 2546-2516). Four of these were for PhD positions. There were 9 civilian positions, AFSC 2546. Thirty-nine of the positions are in the computer career field. All of the people at OL-A are civilians, including 32 meteorologists and meterological technicians of which 11 hold advanced meteorological degrees, and 46 computer personnel. USAFETAC's cadre of military and civilian personnel is well qualified in the many aspects of applied and descriptive climatology. Figure 1 depicts the USAFETAC organizational chart.

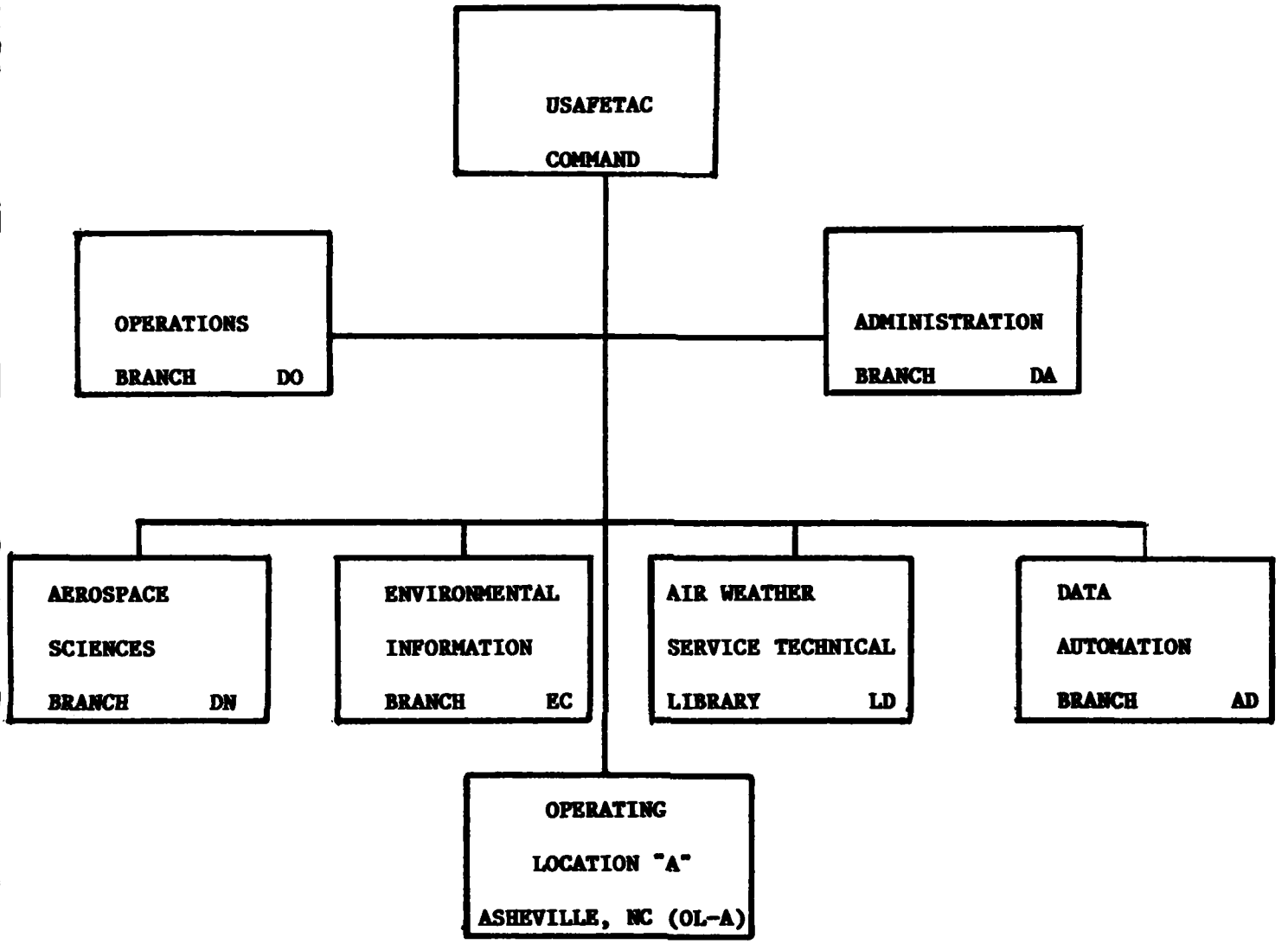

FIGURE 1: ORGANIZATIONAL CHART OF USAFETAC

Chapter 2

USAFETAC BRANCH FUNCTIONS

2-1. **OPERATIONS (DO)** - Advises the commander on operations, plans, programs, projects, and communications. Manages the receipt, processing and distribution of environmental support assistance requests and monitors work progress through management analysis. Develops USAFETAC policies and procedures for project management. Documents the automated data processing system, facility, manpower, and communication requirements for present and future environmental support. Develops, coordinates, and monitors the implementation of Programming Plans (PROPS), Data Automation Requirements (DARs), plans, programs, operations, and war plans. Manages the Duty Officer and wartime readiness activities. Focal point for USAFETAC briefings and visitor programs. (AV638-4024)

2-2. **AEROSPACE SCIENCES (DN)** - Develops, evaluates, and adapts methods, models, and techniques including, but not limited to, numerical models, algorithms, environmental simulation and empirical techniques to meet USAFETAC support requirements. Consults with other branches and customers on developmental efforts and techniques. Is AWS focal point for environmental simulation. Supports ionospheric, solar, and associated post-event studies. Evaluates new data and data sources for applicability. Maintains liaison with the scientific community and currency with literature and developments in applicable scientific areas. (AV638-3902)

2-3. **ENVIRONMENTAL INFORMATION (EC)** - Plans and performs studies and analyses to satisfy customer requests using available analysis techniques. Evaluates and modifies existing analysis techniques to ensure relevance and adequacy. Identifies needs for new techniques and software to the Aerospace Sciences and Data Automation Branches. Evaluates, selects, and applies environmental data sets. Performs consultation services for authorized requestors. Maintains liaison with experts in scientific and technical fields of interest; maintains currency with literature in these fields. (AV638-3158)

2-4. **DATA AUTOMATION (AD)** - Manages and operates the USAFETAC Automated Data Processing System (ADPS) at Scott AFB. Formulates Scott AFB, USAFETAC ADPS requirements. Develops and maintains applications and systems software. Maintains the magnetic tape and software library. Establishes and ensures compliance with USAFETAC software standards and ADPS procedures. Provides consultation services for ADPS users. Provides automation support to build, maintain, store, retrieve, and disseminate environmental data sets. Interacts with the automation community to maintain currency in automation technology, practices, and equipment. (AV638-2768)

2-5. OPERATING LOCATION A (OL-A) - Functions as USAFETAC Data Manager. Plans, monitors, evaluates, directs, and ensures completion of all data management functions. Evaluates AWS data to support environmental assistance request and identifies additional resources needed to meet the mission requirements. Develops and performs climatological studies and analyses as directed by Operations. Provides AWS interface with the National Climatic Data Center (NCDC) on matters of environmental information. Manages all matters pertaining to civilian personnel assigned to OL-A, USAFETAC (AV588-8358 or COMM (704) 259-0201).

2-6. AWS TECHNICAL LIBRARY (LD) - Maintains in-house environmental, astrogeophysical and related discipline collections (such as mathematics, statistics, and computer science) in sufficient depth to allow study from both current and historical perspectives. Catalogues, evaluates, and weeds the library collections. Conducts information scouting and acquisition programs to fulfill present and anticipated informational needs. For AWS and AWS-gained ANG units: Provides centralized acquisition and technical information reference services and technical guidance in maintaining office collections and field libraries. (AV638-4044)

Chapter 3

USAFETAC CAPABILITIES

3-1. TECHNICAL INFORMATION:

a. USAFETAC provides its customers technical information by using the in-house resources of the AWS Technical Library (AWSTL); the Defense Technical Information Center (DTIC); DOD Research, Development, Test, and Evaluation On-Line System (DROLS); the On-Line Cataloging Library Center (OCLC); and several bibliographic systems including DIALOG Information System, Systems Development Corporation and Bibliographic Retrieval Services. DROLS is the Defense RDT&E On-Line System--a secure (to SECRET) bibliographic computer system. It is operated by the DTIC. DROLS has over 1.1 million citations to DOD initiated or related scientific and technical projects and technical reports. It also contains citations to industry basic research funded through the Independent Research and Development Program (this file is propriatory). OCLC is the On-Line Cataloging Library Center, a not-for-profit corporation. The OCLC data base contains bibliographic citations to over 9 million books, monographs, reports, and other library materials. Using the OCLC interlibrary loan module the AWSTL is connected to over 2500 libraries throughout North America. The AWSTL also uses the OCLC acquisition subsystem to order selected books. Staff Meteorologists (STAFFMET), Staff Weather Officers, and general forecasters are provided the following reference services:

(1) Answers to specific questions contained in the technical literature.

(2) Subject bibliographies--listings of technical publications relating to a desired subject.

(3) Current awareness services--listings (usually at 2-week intervals) of recent publications relating to a requestor's question or subject of interest.

(4) Selective dissemination services highlighting new library acquisitions which relate to subject bibliographies or current awareness services previously requested.

(5) Climatological data extracts from published and computer summarized sources.

(6) Technical information searches in other information centers.

(7) Advice to customers as to the authoritativeness, pertinence, and relevance of information resources.

b. After customers have determined what they want, our library services can:

(1) Acquire (purchase) technical information from government or private, domestic or foreign sources.

(2) Quickly order documents on the computer terminals.

(3) Secure interlibrary loan of books and reports not available in the AWSTL collections from over 2500 information centers and libraries.

(4) Circulate materials of the AWSTL to qualified users, i.e., DOD personnel and DOD contractors.

(5) Catalog documents and verify bibliographic information by using the OCLC and DROLS computer systems.

3-2. DATA BASE - USAFETAC prides itself on providing the best data base available. We continually devise better means to quality control the data to ensure our products provide meaningful answers. However, there are parts of the data that must be used with caution, and USAFETAC is careful in how the data are applied. USAFETAC analysts routinely confer with our data "experts" to ensure we do not misuse the data. However, if we release data to outside agencies, we no longer have control over how it is used. We do not encourage this and, therefore, we do not routinely release extensive data dumps to customers.

a. The data base includes:

(1) DATSAV- A Data Base consisting of worldwide surface and upper air weather observations collected through the Automated Weather Network (AWN), decoded at the Air Force Global Weather Central (AFGWC), and stored on magnetic tapes at USAFETAC. OL-A, USAFETAC receives the daily observations from AFGWC. From those they build weekly, then monthly, then yearly DATSAV data sets. From these, a 10 to 30 year period of record tape can be made for each location in DATSAV format. DATSAV refers to the computerized tape format in which decoded weather observations are stored. The data sets of DATSAV are designed to maintain as much of the originally encoded weather observation as possible using the minimum amount of storage. This permits fast, efficient retrieval of specific data to use with various computer programs that USAFETAC uses to satisfy customer requests. Customers that require data extracts (specific information from observations) should first coordinate with USAFETAC before submitting an AWSR 105-18 request. The customer may want a format that would require extensive programming by USAFETAC. This could delay answering the request. There are times when it would be easier for the customer to convert the DATSAV values, than it would be for ETAC. By coordinating with us, the customer can cut down on the time it takes to answer the question, and we can put it in a format that best serves the customer.

(2) REALTIME NEPHANALYSIS (RTNEPH) formerly 3-D NEPHANALYSIS (3DNEPH)--Global analysis of cloud layers based on surface and satellite reports.

(3) High Resolution Analysis Set (HIRAS)--Global upper air multilevel analysis, currently being developed. It should be available to customers by mid to late 1985.

(4) AFGWC Course Mesh Analysis - A global, 16-level analysis of pressures, temperatures, dew-point temperatures, D-values, and winds.

(5) Snow Analysis Data Set - An analysis of snow/no snow for selected regions of the globe.

(6) SESS - Solar geomagnetic and ionospheric observations from the six AWS Solar Environmental Support System sites and over 100 other observing sites world wide.

(7) Station Data Information - weather summaries for selected individual station files worldwide.

(8) Air Weather Service Master Station Catalog - A comprehensive listing of environmental observing sites. USAFETAC receives and stores an updated version on disk.

(9) Total Percent Clear Data Set - Total Percent Clear is derived from the 3DNEPH data set (1/8 mesh data set).

(10) Terrain/Geography Data Set - The Terrain Data Set is derived from AFGWC's High Resolution Geography and Terrain Data Base. It is a worldwide gridded analysis of terrain heights.

(11) Summarized Analysis Data Set - A summary to the daily AFGWC coarse mesh analysis. They are summarized by month. The data are stored by month in an i, j coordinate system.

(12) Specialized Data Sets. Literally hundreds of Specialized Data Sets have been produced as tailored products for specific customers over the years. Because these were products tailored to the requestor's requirements, they are not routinely advertised as available for widespread use. Customers having requirements for specialized data sets should state their requirements in accordance with AWSR 105-18. USAFETAC can then determine the best way to satisfy that requirement; either develop a new customized data set or reproduce an available product.

3-3. APPLICATIONS:

a. Refractive Index Studies. These studies provide refractive index values and refractive gradients from multiple atmospheric soundings. These studies also relate refractive index data to radio-wave propagation in the atmosphere. Refractive summaries (climatologies) for individual radiosonde stations, assessments of weather conditions (post-analyses) to determine

atmospheric causes of anomalous propagation of radio and radar waves, and refractive index data for microwave systems design can be provided. As part of the post-analysis capability, optical raytrace methods can be used to determine propagation patterns in the atmosphere.

b. Rain/Atmospheric Moisture Attenuation of Radiowave Propagation Studies. Estimates of rain event duration and rainrate frequency of occurrence for instantaneous rainrate thresholds are provided using a data base of both instantaneous and clockhour rainrates. These rainfall statistics, along with cloud moisture parameters and freezing level data are used with state-of-the-art attenuation models to estimate the related attenuation of electromagnetic radiation.

c. Air Density, Pressure, and Density Altitude Summaries. Climatological means, extremes, etc., of atmospheric density, pressure altitude, and density altitude are available along with estimates of "worst case" scenarios.

d. Electro-Optical (E-O) Weapons System Assessment. These studies provide assessments of the effect of the environment on reducing weapons system effectiveness. The Infrared Tactical Decision Aid program can be used to estimate maximum acquistion ground range from an IR sensor to the target for user specified weather conditions and mission profiles. A manual method for estimating maximum ground range from a TV sensor to a target is also available.

e. Wind Shear Tables/Histograms. At height increments specified by the user, wind shear over a 1-kilometer layer is calculated from Raob data. At each level, the shear from a specified period of record is displayed in tabular form (as number of occurrences in a shear-magnitude increment) or in computer-plotted histograms. Tables are produced of number-of-occurrences and frequency-of-occurrences of shear within specified range. Histograms (discrete and cumulative) of the same may also be produced. The tables also display mea.., standard deviation, and data count. The output can be used for calculating shear for aircraft, launch vehicles, or re-entry vehicles. This program is limited by resolution of Raobs to a nominal height increment of 1 km, and is applicable to specific Raob reporting locations.

f. Aerial Spray Analyses. The Aerial Spray Deposition Program is a computer program that calculates spray concentrations. It aids in determining optimum flight and meteorological conditions for spraying operations.

g. Stability Wind Rose Summaries. This program calculates the occurrence of Pasquill stability classes and mixing heights for locations with surface observations. The program also produces summaries of wind speeds, directions, and mixing heights for each stability category by month and year.

h. Energy Related Studies. The following are available in the energy area:

(1) Heating and cooling degree-day statistics (See 3-4e).

(2) Computerized Energy Analysis Reference Year (CEARY) data for use in building-load analyses. CEARY data are specially selected surface observations for 12 months for each location.

(3) Solar data for use with CEARY tapes in building solar energy studies.

i. Wind duration studies and other wind parameters required for evaluating the feasibility and sizing of wind power generators.

j. Engineering Design and Construction Studies. Standard engineering design data packages include temperature, precipitation, icing, and extreme wind analyses. Crosswind studies for runway orientation or related problems and meteorological data and climatological narratives for inclusion in base master or comprehensive plans are available along with design freezing index and other data for pavement evaluation studies and complete snow-load studies.

k. Situation Climatic Briefs (SITCLIMS). SITCLIMS are narrative and tabular descripitions of the environment (meteorology) of a certain geographic area produced for the Joint Chiefs of Staff (JCS), Office of the Secretary of Defense (OSD), National Command authorities, etc. A SITCLIM-type product can also be produced for other customers. They are useful to familiarize planners with the general type of weather common to an area. SITCLIMS are complied in USAFETAC Data Summary publications, available to wing DNs, or through the AWSTL.

l. Exercise Support. This support has been provided in the past for major exercises, e.g., REFORGER, TEAM SPIRIT, and BRAVE SHIELD. A wide range of products from weather impact indicators to enroute winds are available. Copies of all products are provided to all participating AWS wings as requested.

m. Low-Level Route Climatologies. These studies are provided to SAC for use in planning low-level training routes. The studies include estimates of the frequency of turbulence and thunderstorms along the proposed route as well as mean winds, temperature, and "D"-values.

n. Special Summaries. Summaries similar to various sections of the Revised Uniform Summary of Surface Weather Observations (RUSSWO) may be prepared. Most frequently requested is the "D Summary", which presents in tabular form the percentage frequency of occurrence of various categories of ceiling and visibility events.

o. Weather Impact Indicators (WII). These indicators show the probability of the occurrence of a particular weather element or a combination of elements at several locations either simultaneously or with a time lag.

p. Liquid Water Content Studies. These data have been developed to evaluate the effect of icing on cruise missiles and other low-flying aircraft. Summaries may be prepared showing icing-potential climatologies using thresholds of temperature and liquid water content.

q. Point Analysis (PA). This product describes the atmospheric conditions above and around a given geographic point including a vertical profile of winds, temperature, absolute humidity, density, pressure, and precipitable water from the surface to 400,000 feet. Also, gridded cloud depictions and site weather pseudo-surface observations are provided. Data from the nearest upper-air observation and/or the Air Force Global Weather Central (AFGWC) gridded analyses fields are used to provide a point analysis.

r. Specialized Studies. Data on upper-air winds, temperature, moisture, density, standard height levels, D-values, and wind shear to include the extreme values of these parameters. Additionally, probability ellipses for debris fallout considerations and inter-level/intra-level correlations of winds can be provided.

s. 3DNEPH Cloud Data Summaries. These summaries include cloud amount distributions of total cloud, cloud cover (low, middle, or high) within various 3DNEPH layer combinations, frequency of occurrence of clear skies, frequency of less than a specified cloud amount above or below various heights. Also, distributions of total cloud cover versus maximum cloud tops, and frequency of occurrence of consecutive grid points along a specified great circle route having specified cloud cover. Monthly summaries for available analysis hours can be prepared for any point, worldwide.

t. Cloud-Free-Line-of-Sight (CFLOS). Static CFLOS probabilities for various look-angles can be produced for special locations using cloud cover distributions from either surface observations or AFGWC 3DNEPH data using the Lund-Shanklin Model. These are used by DOD planners to estimate the possible effectiveness of various Electro-Optical systems.

u. Support to Simulation Studies. Surface observations, 3DNEPH, and various analyzed weather charts for selected scenarios are provided for use in simulation studies.

v. Post Event Analysis. DATSAV surface and upper-air observations, 3DNEPH, AFGWC analyses, and other published information for specific locations and from days to years in duration, can be furnished to answer particular questions.

w. Operational Climatology. USAFETAC has developed worldwide operational climatology and algorithms for integrating this climatology into DOD decisionmaking processes. This work also supports trajectory studies and provides input data for the development of Model Output Statistics (MOS) type studies. The following models and software are currently available.

(1) OCVFIT. This program fits a continuous mathematical function to discrete cumulative distribution functions (CDF) for ceiling and visibility data. The resulting, approximatly continuous, CDFs compact RUSSWO data into a few coefficients.

(2) PTCLIM. This program interpolates a set of arbitrarily distributed data points to the AFGWC 1/8th-mesh grid using the Barnes algorithm. It then provides the option to further interpolate the grid point data to a user's grid of arbitrary resolution (down to a 10-km grid interval) and size or to a single point, using bilinear interpolation in either case. The program is designed to operate with probability data obtained from OCVFIT.

(3) MOSCLIM. A modification of PTCLIM designed to meet the specific needs of the AFGWC MOS program has been developed to efficiently return probability data for long lists of individual points for specified regions, times, and thresholds. This program is designed to run in batch mode at a facility which has the capability to accept addressable input.

(4) DNORAINMOD. This statistical hydrometeor model is applicable to any point in the CONUS for summer or winter from the surface to 13 km. Input consists of location, mean freezing level, rainfall rate, and precipitation and thunderstorm probability. The output includes rain parameters (instantaneous rainfall rates for specific probabilities, liquid water content, median drop diameter, drop-size distribution); cloud paramters (liquid water content, median drop diameter, drop size distribution); and atmospheric parameters (precipitable water). The location can be expressed in terms of AFGWC full-mesh-grid point values.

(5) OVBSM. A soil moisture model obtained from the Canadian Department of Agriculture. Provides an estimate of the changes in the daily soil moisture content at a site in six or less vertical zones throughout the year. Program input includes the initial moisture content in each of the vertical zones, supplemental information on the moisture characteristics of the soil, water use by crops, coefficients for estimating runoff, snow cover, and the modification of moisture stress as a function of available soil moisture and potential evapotranspiration rate as well as crop development dates.

(6) OSMSI. This program generates Simulated Mission Success Indicators (SMSI) for stations that have conditional climatology tables as a function of forecasting capability where the reliability of forecasts decays by 0.98**t, where t is in hours. The algorithm is based on A. Boehm's method. Input data include conditional climatology, station identifier, number of categories, number of months of data, number of forecast times, and the various forecast start times and lengths. The output is generated by means of successive iterations through stations, months, categories, and forecast times using the Transnormalized Regression Probability (TRP) method and consist of Mission Success Indicators (MSIs) as a function of probability correlation, category, and forecast time.

x. Additional Physical Models. USAFETAC has developed additional physical models dealing with a wide range of meteorological and geophysical problems.

(1) Lunar Illumination. The Lunar Illumination Calculator incorporates the physical relationships developed by D.R.E. Brown between lunar altitude, phase angle, solar angle, and illumination intensity to produce a tabular output by hour and day for each month of the year. The software represents an improvement over the old U.S. Navy technique.

(2) Reference Atmospheres. A software package which generates reference atomspheres with monthly and annual statistics from standard upper-air soundings has been developed. This software has been enhanced to allow inclusion of rocketsonde data and to extend the upper limits of the reference atomsphere to near 60 km in intervals of 2 km. Extensive quality controls are included and bad input data are identified.

(3) Vector Wind Models. Software has been developed, based on the work of O.E. Smith of NASA, that calculates a number of wind statistics based on an assumed bivarite normal distribution of the wind. Input consists of five variables: two means, two standard deviations, and a correlation between the u- and v-wind components. The program is interactive and can answer a number of questions such as "What is the probability of a wind speed greater than 50 kts?", or "What is the probability wind rose for a selected location at 10-km altitude?"

3-4. CLIMATIC SUMMARIES FOR BASE WEATHER STATION SUPPORT - The following USAFETAC products are available for routine base weather station operations. Units can request new or updated climatic summaries in accordance with AWSR 105-10 and AWSR 105-18.

a. AWS Climatic Brief. A one-sheet summary of monthly and annual climatic data for a station extracted from its RUSSWO. USAFETAC produces the Climatic Brief using standard criteria and format (see Attachment 1.).

b. AWS Climatic Brief Addendum (AWS Form 11). An addition to the Climatic Brief/Climatic Brief for Limited Duty Stations. Produced either at USAFETAC or at the unit, squadron, or wing level to meet local requirements which are not satisfied by the Climatic Brief/Climatic Brief for Limited Duty Stations.

c. AWS Climatic Brief for Limited Duty Stations. (LDS) A one page synopsis of the climatology at a given location, including both monthly and annual values. Part of this data are extracted directly from the Limited Surface Observations Climatic Summary for that particular site. In addition, summary of the day type data (not normally available for a LDS) from various sources are applied using both objective and subjective techniques. Examples of other sources are: earlier periods of record for the station; contempory

and/or earlier station(s); unofficial station records or published data from other sources (such as indigenous weather services). All sources are evaluated and analyzed such that the data provided will represent the estimate of the various parameters for that station. USAFETAC endeavors to maintain consistency in data content within these summaries, but data availability (or lack thereof) may dicate minor variations in content (see attachment 2.)

d. Crosswind Summary. A summary which gives the percent frequency of past occurrences of specified crosswind components versus standard ceiling/visibility categories.

e. Heating and Cooling Degree Day Summary. A summary containing a set of monthly tables computed by determining the difference between daily mean temperatures and 65°F and then summing these differences for each individual month. For the purpose of calculating degree days, the daily mean temperature is normally defined as the sum of the daily maximum and minimum temperatures divided by two. The use of other mean temperature definitions will be identified in the summaries.

f. Diurnal Temperature/Dew-Point Analysis. This product provides summarized diurnal temperature and dew-point changes by hour for a specific site. It is both ceiling and wind stratified. These data are provided on a monthly basis. Four wind sectors, three wind speed classifications and up to five ceiling categories may be stipulated by the customer. The data are available in both computer paper hard copy and microfiche. Values are displayed in both tabular and graphical form. This product is primarily used as a forecaster aid (see 5WW TN 72-1) and in systems development where temperature and/or humidity variation is important. It is limited to locations where surface weather observation data are available.

g. Revised Uniform Summary of Surface Weather Observation (RUSSWO). A set of surface weather observation summaries for the latest 10 year period of record (or 5 years for new summaries) of hourly data available plus all summary of the day data. USAFETAC/TN-83-001, Aid for Using the RUSSWO, provides a detailed description of RUSSWO contents. The RUSSWO is only available for Type A Stations, i. e., stations with a 24-hour a day/7-day a week observing function.

h. Limited Surface Observation Climatic Summary (LISOCS). Similar to a RUSSWO, it is a set of surface weather observation summaries for the latest 10 year period of record (or 5 years for new summaries) of hourly data for limited duty station. The LISOCS contains data for hours of normal operations only; extraneous or occasional hours are not used. Limited duty stations are classified into the following two types:

(1) Type B - stations that take observations 7 days a week, but less than 24 hours a day.

(2) Type C - stations that take observations less than 7 days a week and less than 24 hours a day.

i. Operational Climatic Data Summary. A climatic summary for locations for which it is not feasible to develop a Climatic Brief or Climatic Brief for Limited Duty Stations due either to a lack of data or to time constraints. Attachment 3 is a sample Operational Climatic Data Summary. A supplement is also available if the original does not cover all required categories (see Attachment 4).

j. Wind Stratified Conditional Climatology Tables. Tables which present, by month, the percent frequency of past hourly weather observations for specified weather categories of ceiling or visibility stratified by surface wind direction and valid for 1 to 48 hours from the initial weather condition. 5WW TN 78-1, The Use of Wind Stratified Conditional Climatological Tables, describes their design and use in short-range forecasting.

k. Pressure Reduction Ratios. Pressure reduction ratios ("r" factors) can be prepared for all Air Weather Service and Air National Guard observing facilities. (Federal Meteorological Handbook FMH-1)

3-5. TECHNICAL DEVELOPMENT - Technical Development consists of the development, evaluation and adaption of state-of-the-art methods, models and techniques to meet Air Force support requirements.

a. Simulation Studies. Real weather data often proves inadequate for use in military operation simulations, war gaming, and weapons system effectiveness studies. In such instances, simulated weather observations and/or forecasts are of great use for evaluating performance over a large number of statistically possible situations, or for providing weather information at points where no historical record exists. USAFETAC has developed techniques to provide these types of information, both for single station locations and for large arrays of statistically correlated points. Climatological distributions for different weather parameters (primarily sky cover, ceiling height, and visibility) have been modeled for a vast number of stations, with the corresponding spatial and serial correlations. A library of models has been constructed to provide simulated weather data from this stored information. New techniques are being developed for modeling and simulation of the joint occurrences of electro-optical variables and conventional meteorological elements. While current models are restricted to two spatial dimensions, future models will be developed to expand simulation into three dimensions.

b. Climate Models. USAFETAC has evaluated two models which have the potential for predicting future climate variations. A continous dialog with the research community and subjective evaluation of state-of-the-art models is ongoing. USAFETAC currently has a limited capability to generate special

outlooks of seasonal temperature 3 to 12 months into the future.

c. Electromagnetic Propagation. USAFETAC technique developers adapt computer models to translate conventional data bases into climatological and case study depictions of environmental effects on electromagnetic radiation; give advice on the physics of electro-magnetic propagation in the natural environment; serve on working groups formed to solve problems related to environmental effects on the propagation of eletromagnetic radiation; and stay abreast of the state-of-the-art in atomspheric physics and propagation physics.

(1) RAYTRACE. USAFETAC now has a general purpose, one-dimensional raytracing model which is capable of defining an arbitrary refracted path in the atmosphere, including such elements as range error and elevation angle error. The model accepts any combination of input geometric variables which define a unique path. Future plans may include the adoption or development of multidimensional raytracing models. USAFETAC also has a visible clear-line-of-sight (VCLOS) model which produces probabilistic estimates of the environmental effects on sensors operating at visible light frequencies (e.g., TV Maverick, and TV GBU-15 precision-guided munitions). Input data consists of surface weather observations, 3DNEPH cloud fields, date, time, location, attack geometry, and target/background albedoes. These data can be processed for single case and climatological studies.

(2) Boundary Layer Optical Turbulence Model. The efficiency of electro-optical systems is affected by optical turbulence, especially in the boundary layer. This model was developed to estimate near-surface optical turbulence effects given basic shelter height or tower data, cloud cover, and other information on surface conditions. The model provides estimates of the refractive index structure function at time intervals of 1 to 15 minutes.

Chapter 4
REQUESTING SUPPORT FROM USAFETAC

4-1. ELIGIBILITY - Department of the Army and Air Force organizations and their civilian contractors are authorized USAFETAC support on a nonreimbursable basis. The US Navy, non DOD, or other nongovernmental agencies are supported by USAFETAC only as directed by higher headquarters.

4-2. CHANNELS - Figure 2 shows the usual channels used to obtain the USAFETAC support. Air Force commanders at all levels have access to USAFETAC services through the AWS unit(s) which support their commands. Army commands/units which do not have an assigned Staff Weather Officer (SWO) request USAFETAC services directly. Other Army commands/units request USAFETAC services through the assigned SWO. Organzations not specifically authorized USAFETAC support are invited to write for additional information to: HQ AFGWC/DO, Offutt AFB, Nebraska 68113

4-3. REQUEST FOR SUPPORT - Request for USAFETAC support should adhere to AWSR 105-18 or Department of the Army Pamphlet 115-1 guidelines and contain, if possible, a concise statement of the problem in terms of either the enviromental factors involved or of the climatological information desired. If the problem cannot be adequately defined or the request properly stated, Air Weather Service Staff Meteorologists (STAFFMET), including USAFETAC specialists, are usually available to assist (see figure 2). The request must state the date that the solution or information is needed and include the priority of the program or project requiring support. The priority is given consideration in the allocation of USAFETAC resources. Requests for library support should be in accordance with AWSR 215-1, Air Weather Service Technical Library Program. Direct contact between the requestor and the AWSTL is authorized. An impact statement detailing the consequences on non-support is also very helpful in allocating resources and essential in obtaining new resources.

4-4. PROJECT LIFE CYCLE - Figure 3 shows the usual route that support requests follow. After the request is received, it is validated by the Operations Branch (DO) to ensure it is from an authorized customer. A customer is any organization external to USAFETAC that requests our services. DO also checks to see that the work involved falls within our charter. An Office of Primary Responsibility is assigned to review and size the request. The results are returned to the Operations Branch. Most requests are either small enough or routine enough to be done without any significant problems. Such requests become formal numbered projects and are placed in the work queue. They are worked until completion within existing resource constraints. Depending on the sizing estimates, DO releases other requests for work, or schedules them for review by unit management. A few

requests are clearly going to have a significant impact from the very start. In these cases, the DO schedules a meeting of the internal Project Management Board (PMB) to review the request. The PMB examines new requests for significant impact, to see if we have the necessary resources. It recommends that we either accept the request as is, modify it, or refer it to Headquarters Air Weather Service for review. Once a project is finished and a product is completed the Branch Chief quality controls it to ensure the product answers the customer's request. The product is sent to the customer and DO closes the project. DO may request quality control by the customer. An evaluation form is sent to the customer for a review of quality, timeliness, completeness, and value of the project work accomplished by USAFETAC.

4-5. **RESPONSIVENESS** - The responsiveness for application requests ranges from hours for Contingency Response Capability (CRC) requests to years for lower priority requests. In addition to priority, responsiveness depends on the complexity of the request. A low priority request can frequently be completed within a few weeks if the relevant computer software is available. Discussing your particular problem on the phone with an "ETAC'er" before routing your 105-18 Support Assistance Request can result in a better defined request that can be done quickly. Thorough staff work is essential to insuring a reasonable, accurate and timely product. Appropriate phone numbers are listed in chapter 2.

DONALD STEPHENS, Capt, USAF
Director of Administration

SUMMARY OF CHANGES

Brings up-to-date the descriptions of USAFETAC's mission, organization and capabilities. Describes changes in the processes the USAFETAC staff uses in answering requests for support from our customers. Details those technical capabilities we no longer possess and those we now have that we didn't two years ago. Defines new data bases and how they may be applied to solve environmental problems. Links USAFETAC 105-3 to policies and responsibilities enumerated in AWSR 105-10 and AWSR 105-18.

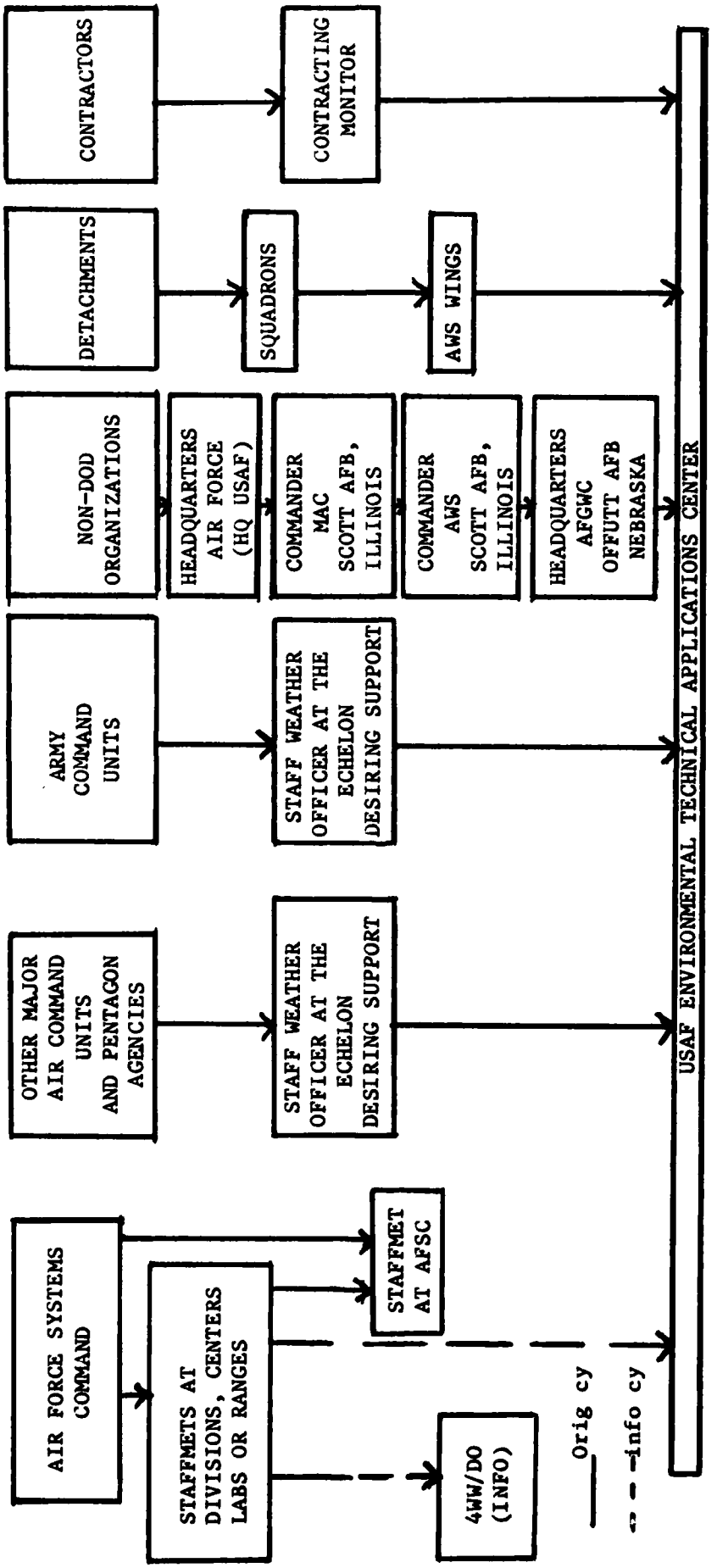

Figure 2: USUAL CHANNELS TO FOLLOW TO OBTAIN USAFETAC SUPPORT

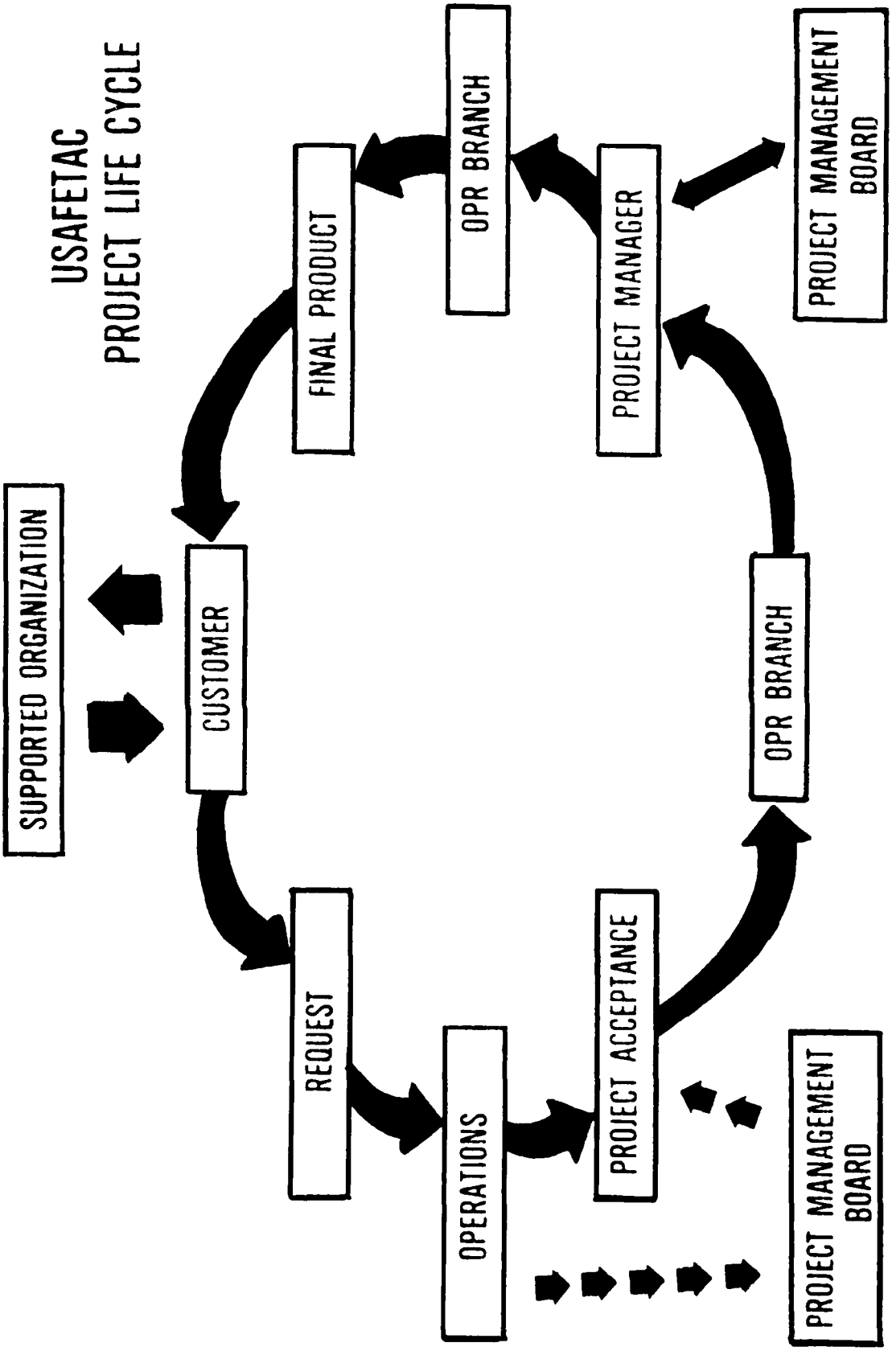

FIGURE 3. PROJECT LIFE CYCLE

CB DATED AUG 71 OBSOLETE

PREPARED BY USAFETAC JUNE 1983

STATION NAME CAPE LISBURNE AFS AK
LOCATION N68 53 W166 57

PERIOD Apr 53 -DEC 82
ELEV 12 FT

STN LTRS: PALU
WSC NO: 701040

AWS CLIMATIC BRIEF

MONTH	TEMPERATURE (°F) MEAN DAILY MAX	MEAN DAILY MIN	MEAN MONTHLY	EXTREME MAX	EXTREME MIN	PRECIPITATION (IN) MONTHLY MEAN	MONTHLY MAX	MONTHLY MIN	MAX 24 HRS	SNOWFALL (IN) MONTHLY MEAN	MONTHLY MAX	MAX 24 HRS
JAN	5	-6	-1	39	-38a	.4	2.4	#	.6a	4	11	6a
FEB	-4	-14	-9	45	-47a	.4	2.0	#	.9	4	20	9
MAR	-2	-12	-7	44a	-39a	.3	1.0	#	.5	3	10	5
APR	11	1	6	46	-22a	.4	2.1	#	.5	4	14	3
MAY	29	21	25	52	-6	.4	1.7	#	.8	3	8	4
JUN	42	33	38	62	20	.7	2.4	#	.9	1	6	3
JUL	50	41	46	73	29	1.8	4.5	.1	1.4	1	8	7
AUG	49	42	45	72	29	3.0	6.3	.5	1.8	1	7	4
SEP	41	35	38	71	15	2.2	5.1	.2	1.1	3	13	5
OCT	26	19	23	57	-12	1.4	3.7	#	1.0	12	36	10
NOV	13	5	9	42a	-23	.9	3.9	#	1.1	8	36	11
DEC	3	-7	-2	43	-40	.4	1.6	#	.9	4	16	9
ANN	22	13	18	73	-47a	12.3	6.3	#	1.8	48	36	11
YR	16	16	16	16	16	26	26	26	26	27	27	27

MONTH	MEAN RELATIVE HUMIDITY (%) LST 0413	MEAN VAPOR PRESSURE (IN Hg)	MEAN DEW PT (°F)	PRESSURE ALTITUDE (FT) 99.95%	SURFACE WINDS PVLG DRCTN (16 PT)	SURFACE WINDS SPEED MEAN (KT)	SURFACE WINDS SPEED MAX (KT) 00	CLOUD COVER MEAN AUD (tenths)	MEAN NUMBER OF DAYS OCCURRENCE OF: PRECIP (IN) ≥ 0.01	PRECIP (IN) ≥ 0.5	SNOWFALL (IN) ≥ 0.1	SNOWFALL (IN) ≥ 1.5	THUNDERSTORMS	FOG VSBY < 7 MI	TEMPERATURE (°F) MAX ≥ 55	MAX ≥ 45	MIN ≤ 10	MIN ≤ 25
JAN	70	.03	-6	1250	ESE	11	73	6	8	#	8	1	0	11	0	0	14	4
FEB	67	.03	-13	950	ESE	10	70	6	6	#	6	1	0	8	0	#	17	6
MAR	70	.02	-13	750	ESE	9	49	5	5	#	5	#	0	12	0	0	19	4
APR	73	.04	-1	750	E	9	63	7	7	#	7	#	0	11	0	#	5	0
MAY	84	.11	20	600	E	8	51	8	7	#	5	#	0	16	0	1	0	0
JUN	87	.19	33	600	E	7	67	8	7	#	1	#	#	19	2	11	0	0
JUL	85	.25	40	600	E	8	58	8	11	1	1	#	#	17	10	23	0	0
AUG	86	.27	42	700	E	9	55	9	16	2	1	#	#	15	7	21	0	0
SEP	84	.20	34	850	E	10	69	9	15	1	5	1	0	11	1	8	0	0
OCT	82	.10	18	950	E	12	53	9	15	#	14	2	0	10	#	#	#	0
NOV	77	.05	4	1200	E	11	66	8	11	#	11	1	0	8	0	0	2	0
DEC	65	.03	-11	1250	E	10	80	6	7	#	7	#	0	7	0	0	13	1
ANN	78	.08	13	950	E	9	80	7	115	4	71	6	#	45	20	64	70	15
YR	10	10	10	10	10	10	10	6	10	26	26	27	27	27	27	16	16	16	16

REMARKS

RUSSWO POR:
HOURLY OBS: JAN 73-DEC 82
DAILY OBS: APR 53-DEC 82

NOTE * DATA NOT AVAILABLE # AMTS < UNITS SHOWN IN HEADING ** INSTANTANEOUS PEAK WINDS $ % CALM GRTR % PLVG DRCTN ∂ BASED ON < FULL MONTHS

CAV FREQ (%)	HRS LST	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	EYR
CEILING LESS THAN 3000 FT AND OR VISIBILITY LESS THAN 3 MI	00-02	34	25	20	35	70	55	50	59	64	69	53	32	47	10
	03-05	35	28	20	36	68	57	47	61	66	67	54	31	48	10
	06-08	35	28	23	34	66	59	51	63	68	69	55	33	49	10
	09-11	37	28	23	31	66	54	53	61	69	68	57	34	48	10
	12-14	38	29	24	35	65	52	50	59	68	66	56	35	48	10
	15-17	36	27	24	38	64	52	49	59	67	66	55	35	48	10
	18-20	30	26	26	40	68	51	53	63	68	73	59	35	49	8
	21-23	29	26	22	38	71	55	50	60	68	69	56	32	48	10
	ALL HRS	34	27	23	36	67	54	50	61	67	68	56	33	48	
CEILING LESS THAN 1500 FT AND/OR VISIBILITY LESS THAN 3 MI	00-02	24	16	12	23	55	45	37	36	30	25	24	18	29	10
	03-05	24	18	12	23	53	45	36	38	30	24	25	17	29	10
	06-08	25	18	12	20	51	47	41	43	31	23	23	20	30	10
	09-11	26	20	14	19	47	41	39	39	31	23	26	20	29	10
	12-14	29	19	14	18	45	36	36	32	29	21	27	19	27	10
	15-17	26	16	14	17	44	34	35	33	29	21	26	19	26	10
	18-20	21	15	13	19	49	36	38	34	30	23	30	17	27	8
	21-23	21	17	13	24	54	42	37	37	31	24	25	1.	29	10
	ALL HRS	25	17	13	20	50	41	37	37	30	23	26	18	28	
CEILING LESS THAN 1000 FT AND OR VISIBILITY LESS THAN 2 MI	00-02	17	10	6	11	39	35	28	27	15	9	10	9	18	10
	03-05	18	12	6	11	38	35	25	29	18	11	10	9	19	10
	06-08	19	12	8	10	39	33	30	31	19	12	11	12	20	10
	09-11	17	12	8	8	34	31	29	26	20	13	14	11	19	10
	12-14	18	11	6	9	32	25	25	23	18	11	16	11	17	10
	15-17	17	9	7	7	30	23	25	21	17	12	15	11	16	10
	18-20	13	7	8	10	34	26	29	22	16	11	16	8	17	8
	21-23	14	9	7	12	39	32	30	26	14	10	13	9	18	10
	ALL HRS	17	10	7	10	36	30	28	26	17	11	13	10	18	
CEILING LESS THAN 200 FT AND/OR VISIBILITY LESS THAN 1/2 MI	00-02	1	2	#	1	3	5	5	2	1	#	1	1	2	10
	03-05	2	2	#	1	3	6	4	2	0	#	2	1	2	10
	06-08	2	2	#	1	3	5	5	4	1	0	1	2	2	10
	09-11	2	2	#	1	2	4	4	2	#	1	1	1	2	10
	12-14	2	1	#	1	1	3	2	2	1	1	2	1	1	10
	15-17	1	1	#	1	2	3	3	1	1	1	1	1	1	10
	18-20	1	1	1	2	3	5	3	1	1	0	1	1	2	8
	21-23	#	1	#	2	4	7	6	3	0	#	1	1	2	10
	ALL HRS	1	2	#	1	3	5	4	2	1	#	1	1	2	

USAFETAC 6/0/88

AWS Climatic Brief
for Limited Duty Station

CB DATED SEP 1983 OBSOLETE

PREPARED BY: USAFETAC
USAFETAC/AWS/MAC

STATION NAME: BAKER AAF GERMANY
LOCATION: N 47 46° E 11 36°
ELEVATION: 2350 FT STATION ID: EDOV
GMT TO LST: +01 WSC # 109710

A W S
CLIMATIC BRIEF
FOR LIMITED
DUTY STATIONS

CAUTION: MEANS AND EXTREMES BELOW ARE ONLY FOR THE HOURS 0600 - 1900 LST
PERIOD OF RECORD: JAN 73-DEC 82 (BROKEN)

MONTH	TEMPERATURES DAILY MEAN HIGH (F)	AVG (F)	LOW (F)	RELATIVE HUMIDITY % LST 06	13	VAPOR PRESS (INS) MG	DEW PT (F)	PRESS ALT FEET 99.99%	SURFACE WINDS PVLG DCTN 16PT	AVG KTS	HIGH KTS	NO CEILING (%)
JAN	35	30	23	88	81	.15	27	3150	W	5	33	30
FEB	39	32	25	86	77	.15	27	3300	E	4	27	37
MAR	44	37	29	78	69	.18	32	3050	W	5	27	34
APR	51	43	35	74	66	.20	34	2900	W	6	21	35
MAY	61	53	45	68	62	.28	43	2850	ENE	5	21	33
JUN	67	59	51	68	63	.36	50	2650	W	5	16	42
JUL	71	63	54	67	61	.39	52	2600	W	4	33	41
AUG	69	61	52	72	64	.40	53	2600	E	4	21	42
SEP	64	56	47	74	65	.35	49	2750	E	4	21	43
OCT	56	48	39	79	70	.25	40	3150	W	4	16	37
NOV	44	39	32	82	75	.19	33	3050	W	4	27	31
DEC	35	30	24	89	83	.15	27	3500	W	5	27	27
ANN	53	46	38	77	70	.24	39	3000	W	4	33	36
YRS	16	16	16	9	9	9	9	9	9	9	9	9

SUPPLEMENTAL DATA FOR THE PERIOD OF RECORD 1953 - 1983 WERE OBTAINED FROM SEVERAL SOURCES: DEUTSCHER WETTERDIENSTES PUBLICATIONS, DATA SUPPLIED BY THE STATION AND OTHER PUBLICATIONS

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS
TEMPERATURES														
EXT MAX (F)	58	67	76	81	87	92	99	93	88	81	72	60	99	31
MEAN (F)	29	31	37	45	53	59	62	61	56	46	38	31	46	23
EXT MIN (F)	-15	-25	-5	17	21	33	39	37	24	21	-1	-14	-25	31
PRECIPITATION														
MAX 24-HOUR	2.9	3.4	1.5	2.1	3.1	2.5	3.8	3.9	2.4	2.8	2.9	2.3	3.9	31
MAX MON (INS)	7.7	9.0	7.0	11E	15E	13E	15E	15E	7.0	9.9	10E	8.9	15E	31
MEAN (INS)	3.9	3.4	3.3	5.1	7.1	8.9	8.2	7.3	4.8	4.4	3.5	3.7	63E	23
MIN MON (INS)	.4	.9	1.0	.9	2.8	4.9	3.8	2.6	1.9	.4	1.2	.8	.4	31
SNOWFALL														
MAX 24-HOUR	19	9	9	22	5	T	0	T	T	6	10	11	22	17
MAX MON (INS)	109	70	47	41	7	T	0	T	T	23	36	69	109	17
MEAN (INS)	26	21	18	18	1	T	0	T	T	4	15	22	125	17
MIN MON (INS)	2	1	2	2	0	0	0	0	0	0	1	1	0	17
PEAK WIND KTS	50	50	48	38	39	38	40	46	40	38	68	54	68	12
DAYS WITH														
THUNDERSTORMS	0	0	1	1	6	8	8	8	3	1	0	0	36	11
SNOWCOVER	23	20	18	6	0	0	0	0	0	1	10	22	100	11
MEAS. PRECIP.	15	15	16	17	19	20	18	17	14	13	15	16	195	11

REMARKS: 1) & MAX MON PRECIP APR 11.8 MAY 15.3 JUN 13.3 JUL 15.7 AUG 15.7 NOV 10.2 ANN 15.7
2) & MEAN PRECIP ANN 63.6
3) PEAK WINDS SELECTED FROM ACTUAL STATION RECORDS BUT THEY MAY NOT REFLECT ALL EXTREMES
4) HOURLY PERIOD OF RECORD JAN 73 - DEC 78 , JAN 80 - DEC 82, 06-19 LST (CLOSED WEEKENDS AND HOLIDAYS)
5) SUPPLEMENTAL DATA PERIOD OF RECORD VARIES WITH SOURCE

SYMBOLS: * DATA NOT AVAILABLE % PERCENT CALM > PREVAILING DIRECTION # AMOUNTS < UNITS SHOWN IN HEADING & SEE REMARKS

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YEARS
CEILING LESS THAN 3000 FT AND/OR VISIBILITY LESS THAN 3 MI	06 - 08	48	47	41	40	27	21	20	29	32	44	46	48	37	9
	09 - 11	42	40	35	39	23	20	19	26	22	37	40	36	32	9
	12 - 14	35	38	35	36	23	17	18	22	20	31	40	36	29	9
	15 - 17	37	39	31	32	19	16	19	18	17	30	44	44	28	9
	18 - 19	45	39	29	34	16	14	10	16	15	36	44	55	29	9
CEILING LESS THAN 1500 FT AND/OR VISIBILITY LESS THAN 3 MI	06 - 08	34	36	31	32	16	8	10	16	19	31	32	34	25	9
	09 - 11	32	30	25	26	11	7	7	11	9	24	27	25	20	9
	12 - 14	26	24	20	19	8	5	6	7	7	17	24	25	16	9
	15 - 17	27	26	17	18	6	4	5	7	6	17	25	30	16	9
	18 - 19	32	29	18	19	5	4	4	7	7	25	26	41	18	9
CEILING LESS THAN 1000 FT AND/OR VISIBILITY LESS THAN 2 MI	06 - 08	26	29	24	25	12	5	6	12	15	22	25	24	19	9
	09 - 11	25	25	19	18	6	3	4	8	5	16	22	19	14	9
	12 - 14	18	14	14	12	3	3	3	4	4	10	17	17	10	9
	15 - 17	20	17	12	12	2	3	3	5	2	11	17	21	10	9
	18 - 19	23	24	13	13	3	4	2	5	3	18	19	20	13	9
CEILING LESS THAN 200 FT AND/OR VISIBILITY LESS THAN 1/2 MI	06 - 08	7	5	3	5	2	1	#	3	5	10	7	6	5	9
	09 - 11	6	4	1	3	#	0	#	1	#	3	4	4	2	9
	12 - 14	3	1	1	2	0	0	0	0	0	#	2	2	1	9
	15 - 17	3	2	2	1	0	0	0	0	0	#	2	3	1	9
	18 - 19	7	5	2	2	0	0	0	0	0	1	3	8	2	9

OPERATIONAL CLIMATIC DATA SUMMARY

STATION: DUSSELDORF, GERMANY — STATION #: 104000 — ICAO ID: EDDL
LOCATION: 51°17'N 006°45'E — ELEVATION (FEET): 147 — LST = GMT + 1
PREPARED BY USAFETAC/ECO JULY 1983 — PERIOD: JANUARY 1975 - DECEMBER 1982

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1. TEMPERATURE (°F)													
EXTREME MAX	57	61	69	77	87	93	95	91	87	79	64	61	95
MEAN DLY MAX	41	43	50	55	64	70	72	73	68	57	48	42	57
MEAN	37	38	43	47	56	62	64	65	60	51	44	39	50
MEAN DLY MIN	33	33	38	39	47	53	56	56	52	45	39	35	44
EXTREME MIN	1	10	21	26	32	39	43	45	34	28	23	5	1
# DAYS > 90	0	0	0	0	0	#	1	#	0	0	0	0	#
# DAYS < 32	12	13	8	4	#	0	0	0	0	1	6	12	56
# DAYS < 0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PRECIPITATION (INCHES)													
MAXIMUM	1.6	1.3	2.5	1.5	1.9	3.2	3.3	2.1	2.0	1.9	2.0	2.7	3.3
MEAN	1.1	0.7	1.2	0.6	1.2	1.5	1.2	1.0	0.9	1.0	1.1	1.4	12.9
MINIMUM	0.8	0.4	0.3	0.3	0.8	0.7	1.1	0.7	0.2	0.2	0.4	0.2	0.2
MAX 24 HR	0.4	0.6	0.7	0.6	0.8	1.5	0.6	0.8	0.5	0.8	0.5	0.6	1.5
# DAYS > 0.01	13	11	10	11	10	11	13	12	11	11	13	13	139
# DAYS > 0.5	0	#	#	#	#	1	#	1	0	#	#	#	2
3. SNOWFALL (INCHES)													
MEAN	*	*	*	*	*	*	*	*	*	*	*	*	*
MAXIMUM	*	*	*	*	*	*	*	*	*	*	*	*	*
MAX 24 HR	*	*	*	*	*	*	*	*	*	*	*	*	*
# DAYS > 0.1	8	6	4	2	#	0	0	0	0	#	2	5	27
# DAYS > 1.5	*	*	*	*	*	*	*	*	*	*	*	*	*
4. MEAN RELATIVE HUMIDITY (%) / VAPOR PRESSURE (IN Hg) / DEWPOINT (°F)													
RH (06 LST)	86	83	84	83	81	83	85	84	86	87	86	86	85
RH (15 LST)	77	68	63	55	53	56	56	54	59	68	74	79	64
VAPOR PRESS	.20	.19	.22	.23	.31	.39	.43	.44	.39	.31	.26	.21	30
DEWPOINT	32	31	36	37	44	51	54	54	51	45	38	34	42
5. SURFACE WINDS (16 PT/KNOTS) / 99.95% HIGHEST PRESSURE ALTITUDE (FEET)													
PVLG DRCTN	SSE	SSE	S	N	NE	N	W	SW	SSE	SSE	SSE	SSE	SSE
MEAN SPEED	10	8	9	8	7	6	7	6	7	8	10	10	8
MAX (PK GSTS)	55	40	63	64	34	43	38	36	44	39	50	47	64
PRESSURE ALT	1100	1300	1000	800	850	550	650	550	850	1000	1050	1350	1350
6. MEAN CLOUD COVER (EIGHTHS) / THUNDERSTORMS / FOG													
CLD COVER	6	5	6	5	5	5	5	5	4	6	6	6	5
# DAYS TSTMS	1	#	1	1	5	7	4	5	3	2	1	1	31
# DAYS FOG	3	3	2	2	1	2	1	3	4	6	3	3	33

REMARKS: * = DATA NOT AVAILABLE # = LESS THAN 0.5 DAY, 0.5 OR 0.05 INCH, OR 0.5 %, AS APPLICABLE $ = % CALM > PVLG DRCTN C = BASED ONLY ON AVAILABLE DATA

SOURCE(S): 1. USAFETAC DATSAV POR JANUARY 1973 - DECEMBER 1982 EDDL
2.
3.

7. PERCENTAGE FREQUENCY OF OCCURRENCE (% FREQ) OF CEILING AND/OR VISIBILITY (CIG/VIS) < 3000/3 STATUTE MILES (MI):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	53	50	39	30	21	26	22	24	27	41	45	53	37
03-05 LST	56	56	45	42	30	35	30	32	31	46	45	56	42
06-08 LST	57	57	52	47	37	40	34	42	44	48	45	53	46
09-11 LST	56	55	52	44	31	33	31	32	34	44	45	53	43
12-14 LST	52	53	45	30	19	22	17	19	21	33	43	51	34
15-17 LST	46	45	35	24	17	17	11	12	16	24	39	51	29
18-20 LST	49	45	33	20	13	12	11	12	17	25	40	50	28
21-23 LST	51	45	33	25	17	18	15	15	20	31	45	53	32
ALL HOURS	53	51	42	33	24	26	22	24	27	37	43	52	36

8. % FREQ OF CIG/VIS < 1500/3 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	32	34	23	16	12	17	12	18	20	29	28	33	23
03-05 LST	35	37	28	25	21	26	20	27	22	34	29	35	28
06-08 LST	38	42	37	34	26	29	23	36	36	37	32	33	33
09-11 LST	39	45	33	24	13	15	13	20	21	31	33	36	27
12-14 LST	32	33	22	11	7	8	5	11	11	17	25	33	18
15-17 LST	28	28	19	8	4	7	3	8	8	13	22	33	16
18-20 LST	27	30	20	10	5	8	4	7	12	16	22	29	16
21-23 LST	30	30	21	11	7	11	7	11	14	21	26	29	19
ALL HOURS	33	35	25	18	12	15	11	18	18	25	27	33	23

9. % FREQ OF CIG/VIS < 1000/2 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	22	24	16	10	7	10	6	10	15	22	18	21	15
03-05 LST	24	26	18	15	14	18	12	18	17	26	18	25	19
06-08 LST	26	28	28	22	15	19	12	25	23	26	23	25	23
09-11 LST	27	32	23	14	8	10	5	13	14	20	22	27	18
12-14 LST	20	23	14	8	4	5	2	5	7	10	15	21	11
15-17 LST	18	20	11	5	3	3	1	2	5	8	15	23	10
18-20 LST	15	22	14	7	4	4	1	3	7	10	13	20	10
21-23 LST	18	20	16	7	4	6	2	5	9	14	16	20	12
ALL HOURS	21	24	18	11	7	9	5	10	12	17	17	23	15

10. % FREQ OF CIG/VIS < 200/0.5 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	3	2	#	1	1	#	0	#	1	5	2	1	1
03-05 LST	2	2	1	1	1	1	#	1	2	6	2	2	2
06-08 LST	2	2	2	1	#	1	#	2	2	5	3	1	2
09-11 LST	2	3	2	#	0	#	0	#	#	3	2	2	1
12-14 LST	2	1	1	0	0	0	0	0	0	#	#	1	#
15-17 LST	2	#	0	0	0	0	0	0	0	#	#	1	#
18-20 LST	1	#	0	0	0	0	0	0	0	#	1	1	#
21-23 LST	2	1	#	#	#	0	0	0	#	2	1	1	1
ALL HOURS	2	2	1	#	#	#	#	#	1	3	1	1	1

OPERATIONAL CLIMATIC DATA SUMMARY SUPPLEMENT

STATION: DUSSELDORF GERMANY | STATION #: 104000 | ICAO ID: EDDL
LOCATION: 51°17'N 006°45'E | ELEVATION (FEET): 147 | LST = GMT + 1
PREPARED BY USAFETAC/ECO JUL 1984 | PERIOD: JANUARY 1973 - DECEMBER 1982

1. PERCENTAGE FREQUENCY OF OCCURRENCE (% FREQ) OF THUNDERSTORMS:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	0	0	0	0	0	#	1	#	#	0	0	#	#
03-05 LST	0	0	0	0	0	#	1	#	1	0	0	0	#
06-08 LST	0	0	0	0	#	0	#	1	#	0	0	0	#
09-11 LST	0	0	#	0	0	#	1	#	#	#	0	0	#
12-14 LST	#	0	0	#	1	1	#	1	#	0	0	0	#
15-17 LST	#	0	#	#	2	1	1	1	1	1	#	0	1
18-20 LST	0	0	1	0	2	1	1	1	1	#	#	0	1
21-23 LST	#	0	#	0	1	2	1	1	1	0	#	0	1
ALL HOURS	#	0	#	#	1	1	1	1	#	#	#	#	#

2. % FREQ OF RAIN AND/OR DRIZZLE:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	18	11	16	11	10	9	8	7	6	14	17	20	12
03-05 LST	20	12	19	11	12	11	10	8	9	14	19	20	14
06-08 LST	19	13	20	16	12	12	10	9	10	15	21	22	15
09-11 LST	18	14	20	13	13	14	11	8	9	15	18	20	14
12-14 LST	17	12	19	16	12	12	10	10	9	13	19	21	14
15-17 LST	17	14	20	18	13	14	11	9	13	12	18	21	15
18-20 LST	20	13	18	13	11	13	12	7	11	12	18	21	14
21-23 LST	20	12	18	13	13	11	11	8	8	11	19	22	14
ALL HOURS	19	13	19	14	12	12	10	8	9	13	19	21	14

3. % FREQ OF SNOW AND/OR ICE PELLETS:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	4	4	2	#	0	0	0	0	0	0	2	2	1
03-05 LST	5	5	2	1	0	0	0	0	0	#	2	5	2
06-08 LST	7	#	2	1	#	0	0	0	0	#	2	6	2
09-11 LST	6	4	3	1	#	0	0	0	0	0	2	5	2
12-14 LST	6	4	1	1	0	0	0	0	0	0	2	4	2
15-17 LST	5	5	1	#	0	0	0	0	0	0	2	4	1
18-20 LST	4	4	1	1	0	0	0	0	0	0	1	5	1
21-23 LST	5	4	1	0	0	0	0	0	0	0	1	4	1
ALL HOURS	5	4	2	1	#	0	0	0	0	#	2	4	1

4. % FREQ OF SURFACE WIND SPEEDS > 25 KNOTS (INCLUDING GUSTS):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
01-03 LST	6	2	5	2	1	#	#	0	2	2	5	8	3
04-06 LST	4	2	4	1	1	#	#	#	1	3	4	7	2
07-09 LST	5	2	5	3	1	1	#	#	2	4	4	7	3
10-12 LST	8	4	9	6	3	2	1	1	6	5	7	11	5
13-15 LST	8	4	10	8	4	4	2	3	5	5	9	10	6
16-18 LST	5	3	7	6	3	2	1	2	4	2	7	9	4
19-21 LST	6	3	4	4	2	1	1	1	2	1	6	10	3
22-24 LST	6	3	4	2	#	1	#	0	2	1	6	9	3
ALL HOURS	6	3	6	4	2	1	1	1	3	3	6	9	4

REMARKS: / = DATA NOT AVAILABLE, # = 0.0 < % < 0.5, MI = STATUTE MILES

SOURCE(S): 1. USAFETAC DATSAV FOR JAN 73 - DEC 82
2.
3.

5. % FREQ OF CEILING AND/OR VISIBILITY (CIG/VIS) < 800/2 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	18	23	15	8	5	9	4	10	14	21	16	19	14
03-05 LST	20	24	17	13	12	17	11	17	17	24	16	23	18
06-08 LST	23	25	26	21	15	18	9	24	22	24	21	22	21
09-11 LST	25	30	23	12	7	8	4	13	14	18	20	25	17
12-14 LST	19	21	14	7	3	5	1	4	7	10	13	19	10
15-17 LST	17	19	10	5	3	3	#	2	5	8	13	20	9
18-20 LST	14	20	14	6	3	4	#	3	7	9	11	18	9
21-23 LST	15	19	14	6	4	5	2	5	9	13	15	17	11
ALL HOURS	19	23	17	10	7	9	4	10	12	16	16	20	14

6. % FREQ OF CIG/VIS < 500/1.5 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	12	11	7	3	1	3	1	3	7	12	7	10	7
03-05 LST	11	13	8	6	4	9	4	9	9	14	9	11	9
06-08 LST	13	14	18	12	6	10	4	14	15	17	11	10	12
09-11 LST	13	19	15	5	2	4	2	6	7	13	12	13	9
12-14 LST	11	14	8	3	2	2	1	2	3	5	7	11	6
15-17 LST	11	12	6	2	1	#	0	1	2	3	6	11	5
18-20 LST	8	10	8	3	2	2	#	1	3	5	5	8	5
21-23 LST	8	8	6	2	1	2	#	1	3	8	6	9	5
ALL HOURS	11	13	10	5	3	4	2	5	6	10	8	11	7

7. % FREQ OF CIG/VIS < 300/1 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	6	4	1	1	1	1	#	1	3	6	3	3	3
03-05 LST	5	5	2	2	1	4	1	3	4	8	5	3	4
06-08 LST	5	5	7	4	1	3	2	5	5	9	5	3	5
09-11 LST	6	8	7	2	#	#	#	2	3	8	5	5	4
12-14 LST	5	5	3	#	#	#	#	0	#	2	2	4	2
15-17 LST	5	3	2	1	#	0	0	#	#	2	2	3	1
18-20 LST	4	2	1	1	1	#	#	#	#	1	2	3	1
21-23 LST	4	3	1	1	#	#	#	#	1	3	2	3	2
ALL HOURS	5	4	3	1	1	1	#	1	2	5	3	4	3

8. % FREQ OF CIG/VIS < 100/0.25 MI:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
00-02 LST	1	1	#	#	#	0	0	#	0	4	1	1	1
03-05 LST	1	1	1	#	1	#	#	#	2	4	1	1	1
06-08 LST	1	2	1	1	0	#	#	#	1	4	2	#	1
09-11 LST	1	1	1	0	0	0	0	0	#	2	0	1	1
12-14 LST	1	#	0	0	0	0	0	0	0	0	#	1	#
15-17 LST	1	#	0	0	0	0	0	0	0	0	#	#	#
18-20 LST	1	#	0	0	0	0	0	0	0	#	#	#	#
21-23 LST	1	1	0	#	#	0	0	0	#	1	#	#	#
ALL HOURS	1	1	#	#	#	0	0	#	#	2	1	#	#

END

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